

1645

RAW SEQUENCE LISTING DATE: 11/02/2000
 PATENT APPLICATION: US/09/077,574A TIME: 10:40:29

Input Set : A:\Davie60seq.txt
 Output Set: N:\CRF3\11022000\I077574A.raw

P.S

ENTERED

4 <110> APPLICANT: Panaccio, Michael
 5 Hasse, Detlef
 7 <120> TITLE OF INVENTION: THERAPEUTIC AND DIAGNOSTIC COMPOSITIONS
 10 <130> FILE REFERENCE: DAVIE60.001APC
 12 <140> CURRENT APPLICATION NUMBER: 09/077574A
 13 <141> CURRENT FILING DATE: 1998-09-24
 15 <160> NUMBER OF SEQ ID NOS: 34
 17 <170> SOFTWARE: FastSEQ for Windows Version 4.0
 19 <210> SEQ ID NO: 1
 20 <211> LENGTH: 1647
 21 <212> TYPE: DNA
 22 <213> ORGANISM: Lawsonia intracellularis
 24 <220> FEATURE:
 25 <221> NAME/KEY: CDS
 26 <222> LOCATION: (1)...(1644)
 28 <400> SEQUENCE: 1
 29 atg gct tct aaa gaa atc ctt ttt gat gct aaa gcc cgt gaa aaa ctt 48
 30 Met Ala Ser Lys Glu Ile Leu Phe Asp Ala Lys Ala Arg Glu Lys Leu
 31 1 5 10 15
 33 tca cga ggt gta gat aaa ctt gca aat gct gtt aaa gta aca ctt gga 96
 34 Ser Arg Gly Val Asp Lys Leu Ala Asn Ala Val Lys Val Thr Leu Gly
 35 20 25 30
 37 cct aaa gcc cgt aat gtc gtt att gaa aag tct ttt ggt tcc cca gtt 144
 38 Pro Lys Gly Arg Asn Val Val Ile Glu Lys Ser Phe Gly Ser Pro Val
 39 35 40 45
 41 att aca aaa gat ggt gta tct gtt gca aaa gaa att gaa ctt gaa gat 192
 42 Ile Thr Lys Asp Gly Val Ser Val Ala Lys Glu Ile Glu Leu Glu Asp
 43 50 55 60
 45 aag ttt gaa aat atg gcc gct caa atg gtt aaa gaa gta gct ccc aaa 240
 46 Lys Phe Glu Asn Met Gly Ala Gln Met Val Lys Glu Val Ala Pro Lys
 47 65 70 75 80
 49 act agc gat att gct ggt gat gga act aca aca gca aca gtc ctt gca 288
 50 Thr Ser Asp Ile Ala Gly Asp Gly Thr Thr Thr Ala Thr Val Leu Ala
 51 85 90 95
 53 caa gct att tat cgt gaa ggt gta aaa ctt gta gca gct ggt cgt aat 336
 54 Gln Ala Ile Tyr Arg Glu Gly Val Lys Leu Val Ala Ala Gly Arg Asn
 55 100 105 110
 57 cct atg gcc att aaa cgt gcc ata gat aaa gct gtt gtt gct gtt act 384
 58 Pro Met Ala Ile Lys Arg Gly Ile Asp Lys Ala Val Val Ala Val Thr
 59 115 120 125
 61 aaa gaa cta agc gac att aca aag cct act cgt gac caa aaa gaa ata 432
 62 Lys Glu Leu Ser Asp Ile Thr Lys Pro Thr Arg Asp Gln Lys Glu Ile
 63 130 135 140
 65 gct caa gtt gga acc att tct gca aac tct gat aca aca ata ggt aat 480
 66 Ala Gln Val Gly Thr Ile Ser Ala Asn Ser Asp Thr Thr Ile Gly Asn
 67 145 150 155 160
 69 atc ata gct gaa gct atg gct aaa gtt gga aaa gga ggt gtt atc aca 528

RAW SEQUENCE LISTING

DATE: 11/02/2000

PATENT APPLICATION: US/09/077,574A

TIME: 10:40:29

Input Set : A:\Davie60seq.txt

Output Set: N:\CRF3\11022000\I077574A.raw

```

70 Ile Ile Ala Glu Ala Met Ala Lys Val Gly Lys Gly Gly Val Ile Thr
71      165      170      175
73 gtt gag gaa gct aaa ggt ctt gaa act aca tta gat gtg gtt gaa gga 576
74 Val Glu Glu Ala Lys Gly Leu Glu Thr Thr Leu Asp Val Val Glu Gly
75      180      185      190
77 atg aag ttt gac cgt ggc tac ctc tct cca tac ttt gta act aat cct 624
78 Met Lys Phe Asp Arg Gly Tyr Leu Ser Pro Tyr Phe Val Thr Asn Pro
79      195      200      205
81 gag aaa atg gtt tgt gaa ctt gat aac cct tat atc ctt tgt aat gag 672
82 Glu Lys Met Val Cys Glu Leu Asp Asn Pro Tyr Ile Leu Cys Asn Glu
83      210      215      220
85 aaa aag att act agc atg aaa gac atg cta cca atc tta gaa caa gtt 720
86 Lys Lys Ile Thr Ser Met Lys Asp Met Leu Pro Ile Leu Glu Gln Val
87 225      230      235      240
89 gct aaa gta aac cgt cca ctc ctt att att gct gaa gac gta gaa ggt 768
90 Ala Lys Val Asn Arg Pro Leu Leu Ile Ile Ala Glu Asp Val Glu Gly
91      245      250      255
93 gaa gca ctt gca aca ctt gta gtc aat aag ctc cgt gga gca ctc caa 816
94 Glu Ala Leu Ala Thr Leu Val Val Asn Lys Leu Arg Gly Ala Leu Gln
95      260      265      270
97 gtt gta gcc gta aaa gct cct ggt ttt ggt gaa cgc cgt aaa gct atg 864
98 Val Val Ala Val Lys Ala Pro Gly Phe Gly Glu Arg Arg Lys Ala Met
99      275      280      285
101 ctt gaa gat att gct atc ctt act gga gga gaa gca ata ttt gaa gat 912
102 Leu Glu Asp Ile Ala Ile Leu Thr Gly Gly Glu Ala Ile Phe Glu Asp
103      290      295      300
105 cgt ggt ata aag ctt gaa aat gta agc ttg tct tct tta gga aca gct 960
106 Arg Gly Ile Lys Leu Glu Asn Val Ser Leu Ser Ser Leu Gly Thr Ala
107 305      310      315      320
109 aaa cgt gta gtt att gac aaa gaa aat act act atc gtt gat ggt gct 1008
110 Lys Arg Val Val Ile Asp Lys Glu Asn Thr Thr Ile Val Asp Gly Ala
111      325      330      335
113 gga aaa tca gaa gat att aaa gct cga gtt aaa caa att cgt gca caa 1056
114 Gly Lys Ser Glu Asp Ile Lys Ala Arg Val Lys Gln Ile Arg Ala Gln
115      340      345      350
117 att gaa gaa aca agc tca gat tat gat cgt gaa aaa ctt caa gaa cgt 1104
118 Ile Glu Glu Thr Ser Ser Asp Tyr Asp Arg Glu Lys Leu Gln Glu Arg
119      355      360      365
121 ctt gca aaa ctt gtt ggt gga gta gct gtt atc cat gtt gga gct gct 1152
122 Leu Ala Lys Leu Val Gly Gly Val Ala Val Ile His Val Gly Ala Ala
123      370      375      380
125 act gaa act gaa atg aaa gag aag aag gat cgt gta gaa gat gct cta 1200
126 Thr Glu Thr Glu Met Lys Glu Lys Lys Asp Arg Val Glu Asp Ala Leu
127 385      390      395      400
129 aat gca aca aga gct gcg gtt gaa gaa ggt att gtc cct ggt ggt ggt 1248
130 Asn Ala Thr Arg Ala Ala Val Glu Glu Gly Ile Val Pro Gly Gly Gly
131      405      410      415
133 act gct ttt gtc cgc tcc att aaa gtc ctt gat gat att aaa cct gct 1296
134 Thr Ala Phe Val Arg Ser Ile Lys Val Leu Asp Asp Ile Lys Pro Ala

```

RAW SEQUENCE LISTING DATE: 11/02/2000
 PATENT APPLICATION: US/09/077,574A TIME: 10:40:29

Input Set : A:\Davie60seq.txt
 Output Set: N:\CRF3\11022000\I077574A.raw

```

135          420          425          430
137 gat gat gat gaa ctt gct gga ctt aat atc atc cgt cgt tct ctt gaa 1344
138 Asp Asp Asp Glu Leu Ala Gly Leu Asn Ile Ile Arg Arg Ser Leu Glu
139          435          440          445
141 gag cct tta cgt caa att gct gca aat gct ggc tat gaa ggt tct att 1392
142 Glu Pro Leu Arg Gln ile Ala Ala Asn Ala Gly Tyr Glu Gly Ser Ile
143          450          455          460
145 gtt gta gaa aaa gtt cgt gaa cca aaa gat ggt ttt gga ttt aat gct 1440
146 Val Val Glu Lys Val Arg Glu Pro Lys Asp Gly Phe Gly Phe Asn Ala
147 465          470          475          480
149 gca tca gga gaa tat gaa gac ctt att aaa gct ggt gtc att gat cct 1488
150 Ala Ser Gly Glu Tyr Glu Asp Leu ile Lys Ala Gly Val Ile Asp Pro
151          485          490          495
153 aaa aaa gtt aca cgt att gca tta caa aat gca gca tca gta gcc tcc 1536
154 Lys Lys Val Thr Arg Ile Ala Leu Gln Asn Ala Ala Ser Val Ala Ser
155          500          505          510
157 tta ctt cta act aca gaa tgc gct att gct gaa aaa cca gaa cct aaa 1584
158 Leu Leu Leu Thr Thr Glu Cys Ala Ile Ala Glu Lys Pro Glu Pro Lys
159          515          520          525
161 aaa gat atg cct atg cct ggc ggt ggt atg ggt ggt atg ggt ggt atg 1632
162 Lys Asp Met Pro Met Pro Gly Gly Gly Met Gly Gly Met Gly Gly Met
163          530          535          540
165 gac ggt atg tac tag 1647
166 Asp Gly Met Tyr
167 545
170 <210> SEQ ID NO: 2
171 <211> LENGTH: 548
172 <212> TYPE: PRT
173 <213> ORGANISM: Lawsonia intracellularis
175 <400> SEQUENCE: 2
176 Met Ala Ser Lys Glu Ile Leu Phe Asp Ala Lys Ala Arg Glu Lys Leu
177 1 5 10 15
178 Ser Arg Gly Val Asp Lys Leu Ala Asn Ala Val Lys Val Thr Leu Gly
179 20 25 30
180 Pro Lys Gly Arg Asn Val Val ile Glu Lys Ser Phe Gly Ser Pro Val
181 35 40 45
182 Ile Thr Lys Asp Gly Val Ser Val Ala Lys Glu Ile Glu Leu Glu Asp
183 50 55 60
184 Lys Phe Glu Asn Met Gly Ala Gln Met Val Lys Glu Val Ala Pro Lys
185 65 70 75 80
186 Thr Ser Asp Ile Ala Gly Asp Gly Thr Thr Thr Ala Thr Val Leu Ala
187 85 90 95
188 Gln Ala Ile Tyr Arg Glu Gly Val Lys Leu Val Ala Ala Gly Arg Asn
189 100 105 110
190 Pro Met Ala Ile Lys Arg Gly Ile Asp Lys Ala Val Val Ala Val Thr
191 115 120 125
192 Lys Glu Leu Ser Asp Ile Thr Lys Pro Thr Arg Asp Gln Lys Glu Ile
193 130 135 140
194 Ala Gln Val Gly Thr Ile Ser Ala Asn Ser Asp Thr Thr Ile Gly Asn

```

RAW SEQUENCE LISTING

DATE: 11/02/2000

PATENT APPLICATION: US/09/077,574A

TIME: 10:40:29

Input Set : A:\Davie60seq.txt

Output Set: N:\CRF3\11022000\I077574A.raw

195	145				150					155				160
196	Ile	Ile	Ala	Glu	Ala	Met	Ala	Lys	Val	Gly	Lys	Gly	Gly	Val
197					165					170				175
198	Val	Glu	Glu	Ala	Lys	Gly	Leu	Glu	Thr	Thr	Leu	Asp	Val	Val
199					180					185				190
200	Met	Lys	Phe	Asp	Arg	Gly	Tyr	Leu	Ser	Pro	Tyr	Phe	Val	Thr
201					195					200				205
202	Glu	Lys	Met	Val	Cys	Glu	Leu	Asp	Asn	Pro	Tyr	Ile	Leu	Cys
203					210					215				220
204	Lys	Lys	Ile	Thr	Ser	Met	Lys	Asp	Met	Leu	Pro	Ile	Leu	Glu
205	225									230				240
206	Ala	Lys	Val	Asn	Arg	Pro	Leu	Leu	Ile	Ile	Ala	Glu	Asp	Val
207					245					250				255
208	Glu	Ala	Leu	Ala	Thr	Leu	Val	Val	Asn	Lys	Leu	Arg	Gly	Ala
209					260					265				270
210	Val	Val	Ala	Val	Lys	Ala	Pro	Gly	Phe	Gly	Glu	Arg	Arg	Lys
211					275					280				285
212	Leu	Glu	Asp	Ile	Ala	Ile	Leu	Thr	Gly	Gly	Glu	Ala	Ile	Phe
213					290					295				300
214	Arg	Gly	Ile	Lys	Leu	Glu	Asn	Val	Ser	Leu	Ser	Ser	Leu	Gly
215	305									310				320
216	Lys	Arg	Val	Val	Ile	Asp	Lys	Glu	Asn	Thr	Thr	Ile	Val	Asp
217					325					330				335
218	Gly	Lys	Ser	Glu	Asp	Ile	Lys	Ala	Arg	Val	Lys	Gln	Ile	Arg
219					340					345				350
220	Ile	Glu	Glu	Thr	Ser	Ser	Asp	Tyr	Asp	Arg	Glu	Lys	Leu	Gln
221					355					360				365
222	Leu	Ala	Lys	Leu	Val	Gly	Gly	Val	Ala	Val	Ile	His	Val	Gly
223					370					375				380
224	Thr	Glu	Thr	Glu	Met	Lys	Glu	Lys	Lys	Asp	Arg	Val	Glu	Asp
225	385									390				400
226	Asn	Ala	Thr	Arg	Ala	Ala	Val	Glu	Glu	Gly	Ile	Val	Pro	Gly
227					405					410				415
228	Thr	Ala	Phe	Val	Arg	Ser	Ile	Lys	Val	Leu	Asp	Asp	Ile	Lys
229					420					425				430
230	Asp	Asp	Asp	Glu	Leu	Ala	Gly	Leu	Asn	Ile	Ile	Arg	Arg	Ser
231					435					440				445
232	Glu	Pro	Leu	Arg	Gln	Ile	Ala	Ala	Asn	Ala	Gly	Tyr	Glu	Gly
233					450					455				460
234	Val	Val	Glu	Lys	Val	Arg	Glu	Pro	Lys	Asp	Gly	Phe	Gly	Phe
235	465									470				480
236	Ala	Ser	Gly	Glu	Tyr	Glu	Asp	Leu	Ile	Lys	Ala	Gly	Val	Ile
237					485					490				495
238	Lys	Lys	Val	Thr	Arg	Ile	Ala	Leu	Gln	Asn	Ala	Ala	Ser	Val
239					500					505				510
240	Leu	Leu	Leu	Thr	Thr	Glu	Cys	Ala	Ile	Ala	Glu	Lys	Pro	Glu
241					515					520				525
242	Lys	Asp	Met	Pro	Met	Pro	Gly	Gly	Gly	Met	Gly	Gly	Met	Gly
243					530					535				540

RAW SEQUENCE LISTING DATE: 11/02/2000
 PATENT APPLICATION: US/09/077,574A TIME: 10:40:29

Input Set : A:\Davie60seq.txt
 Output Set: N:\CRF3\11022000\I077574A.raw

```

244 Asp Gly Met Tyr
245 545
248 <210> SEQ ID NO: 3
249 <211> LENGTH: 306
250 <212> TYPE: DNA
251 <213> ORGANISM: Lawsonia intracellularis
253 <220> FEATURE:
254 <221> NAME/KEY: CDS
255 <222> LOCATION: (1)...(303)
257 <400> SEQUENCE: 3
258 atg aac ctg aaa cct ttg aat gac cgt gtt tta gta aaa cgt ctt gaa 48
259 Met Asn Leu Lys Pro Leu Asn Asp Arg Val Leu Val Lys Arg Leu Glu
260 1 5 10 15
262 tct gaa gaa aaa aca gct ggt gga ctc tat atc cct gat act gct aaa 96
263 Ser Glu Glu Lys Thr Ala Gly Gly Leu Tyr Ile Pro Asp Thr Ala Lys
264 20 25 30
266 gaa aaa cca tct cgt ggt gaa gtt gtt gct gtt gga cct ggt aaa cat 144
267 Glu Lys Pro Ser Arg Gly Glu Val Val Ala Val Gly Pro Gly Lys His
268 35 40 45
270 aca gat gat ggt aaa tta ata cct atg gct gta aaa gca gga gat aca 192
271 Thr Asp Asp Gly Lys Leu Ile Pro Met Ala Val Lys Ala Gly Asp Thr
272 50 55 60
274 gtt ctt ttt aat aag tat gca gga aca gaa gta aag ctt gat ggt gta 240
275 Val Leu Phe Asn Lys Tyr Ala Gly Thr Glu Val Lys Leu Asp Gly Val
276 65 70 75 80
278 gag cat cta gtt atg cgt gaa gat gac atc cta gct gtt att act gga 288
279 Glu His Leu Val Met Arg Glu Asp Asp Ile Leu Ala Val Ile Thr Gly
280 85 90 95
282 gaa act ggc cgc aag tga 306
283 Glu Thr Gly Arg Lys
284 100
287 <210> SEQ ID NO: 4
288 <211> LENGTH: 101
289 <212> TYPE: PRT
290 <213> ORGANISM: Lawsonia intracellularis
292 <400> SEQUENCE: 4
293 Met Asn Leu Lys Pro Leu Asn Asp Arg Val Leu Val Lys Arg Leu Glu
294 1 5 10 15
295 Ser Glu Glu Lys Thr Ala Gly Gly Leu Tyr Ile Pro Asp Thr Ala Lys
296 20 25 30
297 Glu Lys Pro Ser Arg Gly Glu Val Val Ala Val Gly Pro Gly Lys His
298 35 40 45
299 Thr Asp Asp Gly Lys Leu Ile Pro Met Ala Val Lys Ala Gly Asp Thr
300 50 55 60
301 Val Leu Phe Asn Lys Tyr Ala Gly Thr Glu Val Lys Leu Asp Gly Val
302 65 70 75 80
303 Glu His Leu Val Met Arg Glu Asp Asp Ile Leu Ala Val Ile Thr Gly
304 85 90 95
305 Glu Thr Gly Arg Lys

```

FI

Please Note:

Use of n and/or Xaa have been detected in the Sequence Listing. Please review the Sequence Listing to ensure that a corresponding explanation is presented in the <220> to <223> fields of each sequence which presents at least one n or Xaa.

VERIFICATION SUMMARY

DATE: 11/02/2000

PATENT APPLICATION: US/09/077,574A

TIME: 10:40:30

Input Set : A:\Davie60seq.txt

Output Set: N:\CRF3\11022000\I077574A.raw

L:400 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:5
L:401 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:5
L:402 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:5
L:424 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:6
L:425 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:6
L:428 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:6
L:429 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:6
L:469 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:7
L:484 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:8
L:550 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9
L:560 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9
L:569 M:336 W: Invalid Amino Acid Number in Coding Region, SEQ ID:9
L:573 M:336 W: Invalid Amino Acid Number in Coding Region, SEQ ID:9
L:577 M:336 W: Invalid Amino Acid Number in Coding Region, SEQ ID:9
L:581 M:336 W: Invalid Amino Acid Number in Coding Region, SEQ ID:9
L:585 M:336 W: Invalid Amino Acid Number in Coding Region, SEQ ID:9
L:589 M:336 W: Invalid Amino Acid Number in Coding Region, SEQ ID:9
L:593 M:336 W: Invalid Amino Acid Number in Coding Region, SEQ ID:9
L:595 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9
L:596 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9
L:597 M:336 W: Invalid Amino Acid Number in Coding Region, SEQ ID:9
L:627 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:10
L:656 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:11
L:677 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:678 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:689 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:690 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:693 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:694 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:697 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:698 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:705 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:706 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:709 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:713 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:714 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:717 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:718 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:721 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:722 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:12
L:737 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:13
L:743 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:13
L:745 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:13
L:747 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:13
L:766 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:14
L:768 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:14
L:770 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:14
L:774 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:14

VERIFICATION SUMMARY
PATENT APPLICATION: US/09/077,574A

DATE: 11/02/2000
TIME: 10:40:30

Input Set : A:\Davie60seq.txt
Output Set: N:\CRF3\11022000\I077574A.raw

L:804 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:15
L:805 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:15
L:808 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:15
L:809 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:15
L:812 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:15
L:816 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:15
L:817 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:15
L:857 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:17
L:859 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:17
L:861 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:17